IN THE CLAIMS:

Please amend the claims as shown in the following claim listing.

CLAIM LISTING:

1. (Original) A process to produce a predictive data set which can be used to predict the property of a plating solution, said process comprising:

(a) obtaining a sample set, wherein each sample comprises a plating solution of good performance;

(b) obtaining an electroanalytical response for each said sample to produce a electroanalytical response data set;

(c) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(d) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set; and

(e) validating said training data set to produce said predictive data set for a predictive model.

2. (Original) A process of claim 1 wherein said property is selected from the group consisting of:

a concentration of individual component of said electroplating bath;
an amount of breakdown products accumulated in said electroplating bath;
an amount of foreign contaminants accumulated in said electroplating bath;
a temperature of said electroplating bath;
a quantity of hysteresis on recorded voltammogram;

or combinations thereof.

3. (Original) A process of claim 1, wherein said property comprises an overall plating performance.

4. (Original) A process of claim 3, wherein said overall plating performance is selected from the group consisting of:

throwing power;
brightness of the deposit;
tensile strengths of the deposit;
ductility of the deposit;
internal stress of the deposit;
solderability performance;
resistance to thermal shock;
uniformity of the deposit;
capability of uniform filling through holes;
capability of filling submicron features in a substrate surface;
or combinations thereof.

5. (Original) A process according to claim 1, wherein said plating solution is an electroplating bath.

6. (Currently Amended) A process of claim 5, wherein said electroplating bath comprises a plating bath of one or more metals selected from the ~~following~~ group consisting of: Cu, Sn, Pb, Zn, Ni, Ag, Cd, Co, Cr, and/or their alloys.

7. (Original) A process according to claim 1, wherein said plating solution is an electroless plating bath.

8. (Currently Amended) A process of claim 7, wherein said electroless plating bath comprises an autocatalytic plating bath of one or more metals selected from the ~~following~~ group consisting of: Cu, Sn, Pb, Ni, Ag, Au, and/or their alloys.

9. (Currently Amended) A process of claim 7, wherein said electroless plating bath comprises an immersion plating bath of one or more metals selected from the ~~following~~ group consisting of: Cu, Sn, Pb, Ni, Ag, Au and/or their alloys.

10. (Original) A process according to claim 1, wherein said plating solution is selected from the group consisting of:

an electrowinning bath;
an electrorefining bath;
an electropolishing bath;
an electroforming bath; or
an electromicromachining bath.

11. (Currently Amended) A process of claims 10, wherein said electroplating bath comprises a plating bath of one or more metals selected from the ~~following~~ group consisting of: Cu, Sn, Pb, Zn, Ni, Ag, Cd, Co, Cr, and/or their alloys.

12. (Original) A process of claim 1, wherein the sample set of step (a) comprises plating solutions of known concentration within specification range.

13. (Original) A process according to claim 1, wherein the sample data set of step (a) is obtained by design of experiment (DOE) routines.

14. (Original) A process according to claim 13, wherein said DOE routine is multicomponent multilevel linear orthogonal array.

15. (Original) A process according to claim 13, wherein said DOE routine is multicomponent multilevel fractional factorial.

16. (Original) A process of claim 1, wherein the sample set of step (a) comprises freshly prepared electroplating solutions of known concentration within specification range.

17. (Currently Amended) A process of claim 1, wherein said sample set of step (a) comprises industrial plating solutions with well known performance, an [[(]] empirical sample set [[)]].

18. (Currently Amended) A process to produce a predictive data set which can be used to predict the property of a plating solution, said process comprising:

(a) obtaining a sample set, wherein each sample comprises a plating solution of good performance;

(b) obtaining an electroanalytical response for each said sample to produce a electroanalytical response data set;

(c) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(d) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set; and

(e) validating said training data set to produce said predictive data set for a predictive model

~~A process according to claim 1~~

, wherein the electroanalytical response of step (b) is obtained by DC Voltammetry.

19. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC cyclic Voltammetry.

20. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Linear Scan Voltammetry.

21. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Anodic Stripping Voltammetry.

22. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Cathodic Stripping Voltammetry.

23. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Adsorptive Stripping Voltammetry.

24. (Original) A process of claim 19, wherein the DC Voltammetry comprises DC Cyclic Voltammetric Stripping technique.

25. (Original) A process according to claim 1, wherein the electroanalytical response of step (b) is obtained by a technique selected from the group

consisting of:

DC Staircase Voltammetry;
Normal Pulse Voltammetry;
Reverse Pulse Voltammetry;
Differential Pulse Voltammetry;
Square Wave Voltammetry;
AC Voltammetry;
Chronoamperometry;
Chronopotentiometry;
Electrochemical Impedance Spectroscopy technique;
Polarographic techniques;
or combinations thereof.

26. (Currently Amended) A process according to claim 1, wherein said electroanalytical response of step (b) comprises a plurality of data points.

27. (Original) A process according to claim 1, wherein said electroanalytical response of step (b) is a combination of one or more portions of a complete electroanalytical response.

28. (Original) A process according to claim 1, wherein said electroanalytical response of step (b) comprises a combination of one or more portions of independent electroanalytical responses.

29. (Original) A process of claim 1, wherein said decomposition method of step (d) is selected from the group of:

Principal Component Analysis (PCA);

calculation of Mahalanobis Distance (MD);

calculation of Mahalanobis Distance with residuals (MDR);

calculation by Simple Modeling of Class Analogy (SIMCA);

calculation of F^s ratio;

internal validation;

external validation;

and combinations thereof.

30. (Currently Amended) A process to predict the property of ~~said~~ a plating solution, said process comprising:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model; and

(b) using said predictive data set to predict the property of said plating solution, said property predicted by:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set; and

(b4) applying said predictive model to predict property of each said unknown sample.

31. (Currently Amended) A process to detect faulty performance of ~~said~~ a plating solution, said process comprising:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model; and

(a7) specifying the limits of good and faulty performance of said plating solution;

and

(b) using said predictive data set to predict the property of said plating

solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set;

(b4) applying said predictive model to predict property of each said unknown sample; and

(b5) qualifying said unknown samples as correct or faulty.

32. (Currently Amended) A method of monitoring performance of plating solution in order to perform controlled feed and bleed procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model;

(a7) defining the limits of said property for said plating solution that requires

feed and bleed procedure; and

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set;

(b4) applying said predictive model to predict property of each said unknown sample; and

(b5) qualifying said unknown samples as a ready or not ready solution for feed and bleed procedure.

33. (Currently Amended) A method of monitoring performance of electroplating solution in order to perform controlled purification treatment procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model; and

(a7) defining the limits of said property for said plating solution that requires purification treatment; and

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set;

(b4) applying said predictive model to predict property of each said unknown sample; and

(b5) qualifying said unknown samples as ready or not ready for purification treatment.

34. (Cancelled).

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